Amendments to the Claims

Please amend Claims 1, 34 and 40. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Currently Amended) A method for curing a defect in the fabrication of a composite gas separation module, comprising the steps of:
   a) depositing a first gas-selective material over a porous substrate to form a coating on the substrate, thereby forming a coated substrate, wherein the coated substrate contains at least one defect;
   b) selectively surface activating the coated substrate proximate to the defect by forming a layer on the coated substrate at the defect that chemically reduces a gas-selective metal component of a liquid activation composition, and subsequently applying the liquid activation composition to the layer, thereby forming at least one selectively surface activated region of nuclei on the coated substrate, said nuclei including the gas-selective metal; and
   c) preferentially depositing a second material on the selectively surface activated region of the coated substrate, whereby the defect is cured.

2. (Original) The method of Claim 1 wherein at least one of the first material and the second material includes a gas-selective material.

3. (Original) The method of Claim 2 wherein both the first material and the second material include a gas-selective material.

4. (Original) The method of Claim 2 wherein the gas-selective material is a hydrogen-selective metal or an alloy thereof.

5. (Original) The method of Claim 4 wherein the hydrogen-selective metal is palladium or an alloy thereof.

6. (Original) The method of Claim 5 wherein the hydrogen-selective metal is palladium alloyed with at least one of the metals selected from the group consisting of copper, silver, gold, platinum, ruthenium, rhodium, yttrium, cerium and indium.

7. (Original) The method of Claim 1 wherein depositing the first material over the porous substrate includes depositing an alloy over the porous substrate or on the selectively surface activated region, and wherein depositing an alloy includes applying at least two metals over the porous substrate and thermally treating the metals to form the alloy.

8. (Original) The method of Claim 1 wherein the first material includes a zeolite.

9. (Original) The method of Claim 1 wherein depositing the first material over the porous substrate includes the step of depositing a hydrogen-selective metal component over another component of the first material that is not hydrogen-selective prior to selectively surface activating the coated substrate proximate to the defect.

10. (Original) The method of Claim 1 further including the step of surface activating the porous substrate prior to depositing the first material.

11. (Original) The method of Claim 1 further including the step of depositing a metal selected from the group consisting of palladium, gold and platinum on the porous substrate prior to depositing the first material.

12. (Original) The method of Claim 1 further including the step of forming an intermetallic diffusion barrier on the porous substrate prior to depositing the first material.

13. (Original) The method of Claim 12 wherein forming an intermetallic diffusion barrier on the porous substrate includes forming a ceramic coating on the surface of the porous substrate.

14. (Original) The method of Claim 1 wherein depositing the first material over the porous substrate includes depositing the first material by a method selected from the group consisting of electroless plating, electroplating, thermal deposition, chemical vapor deposition, spray deposition, sputter coating, e-beam evaporation, ion beam evaporation and spray pyrolysis.

15. (Original) The method of Claim 1 wherein the defect includes a pore and selectively surface activating the coated substrate proximate to the defect includes surface activating the pore.

16. (Original) The method of Claim 1 wherein the step of selectively surface activating the coated substrate proximate to the defect includes selectively seeding the coated substrate proximate to the defect with nuclei of a gas-selective metal.

17. (Original) The method of Claim 16 wherein a liquid activation composition is used to selectively seed the coated substrate proximate to the defect with nuclei of a gas-selective metal.

18. (Original) The method of Claim 17 wherein the first material is deposited over the porous substrate in an amount sufficient to impede flow of a liquid activation composition from a first side of the coated substrate to a second side of the coated substrate.

19. (Original) The method of Claim 17 wherein the first material is deposited over the porous substrate in an amount sufficient to substantially prevent flow of a liquid

activation composition from the first side of the coated substrate to the second side of the coated substrate.

20. (Original) The method of Claim 17 wherein the first material is deposited over the porous substrate in an amount sufficient to substantially prevent emergence of the liquid activation composition, applied from the first side of the coated substrate, from the defect and onto the second side of the coated substrate.

21. (Original) The method of Claim 1 wherein the porous substrate has a first side and a second side, wherein selectively surface activating the coated substrate proximate to the defect includes surface activating the coated substrate proximate to the defect from the first side of the porous substrate, and wherein preferentially depositing the second material on the selectively surface activated region of the coated substrate includes depositing the second material on the selectively surface activated region from the second side of the porous substrate.

22. (Original) The method of Claim 1 wherein preferentially depositing the second material on the selectively surface activated region of the coated substrate includes depositing the second material by electroless plating.

23. (Original) The method of Claim 1 wherein the first material includes a first component and a second component and wherein the step of depositing the first material over the porous substrate includes the steps of:

a) depositing the first component over the porous substrate, thereby forming a first component-coated substrate, wherein the first component-coated substrate contains at least one defect;

b) selectively surface activating the first component-coated substrate proximate to the defect, thereby forming at least one selectively surface activated region of the first component-coated substrate; and

c) preferentially depositing the second component on the selectively surface activated region of the first component-coated substrate.

24. (Original) The method of Claim 23 wherein the first material further includes a third component and the method further includes the step of depositing the third component over the second component, thereby forming the coated substrate.

25. (Original) The method of Claim 23 wherein at least one of the first component and the second component includes a gas-selective material.

26. (Original) The method of Claim 1 wherein a dense gas-selective membrane is formed over the porous substrate.

27. (Original) The method of Claim 26 wherein the dense gas-selective membrane includes palladium or an alloy thereof.

28. (Original) The method of Claim 1 wherein the porous substrate is a porous metal substrate.

29. (Original) The method of Claim 28 wherein the porous metal substrate is an alloy containing chromium and nickel.

30. (Original) The method of Claim 29 wherein the alloy further contains molybdenum.

31. (Original) The method of Claim 28 wherein the porous metal substrate is stainless steel.

32. (Original) The method of Claim 1 wherein the porous substrate is a porous ceramic substrate.

33. (Original) A composite gas separation module fabricated by a process that includes the method of Claim 1.

34. (Currently Amended) The composite gas separation module fabricated by a process that includes the method of Claim 26 wherein the thickness of the dense gas-selective membrane is less than about three times the diameter of the largest pore of the porous substrate.

35. (Original) The composite gas separation module of Claim 34 wherein the dense gas-selective membrane includes palladium or an alloy thereof.

36. (Original) The composite gas separation module of Claim 34 wherein the thickness of the dense gas-selective membrane is less than about 14 microns in thickness.

37. (Original) A method for selectively separating hydrogen gas from a hydrogen gas-containing gaseous stream, comprising the step of directing the hydrogen gas-containing gaseous stream to a composite gas separation module formed by a process that includes the method of Claim 1, whereby hydrogen gas is at least partially partitioned from the gaseous stream by passing through a dense hydrogen-selective metal membrane.

38. (Original) The method of Claim 37 further including the step of reacting hydrogen gas-producing reactants to produce the gaseous stream.

39. (Original) The method of Claim 37 wherein the dense hydrogen-selective metal membrane includes palladium or an alloy thereof.

40. (Currently Amended) A method for fabricating a plated substrate, comprising the steps of:

a) plating a first gas-selective metal over a porous substrate to form a coating on the substrate, thereby forming a coated substrate, wherein the coated substrate contains at least one defect;

b) selectively surface activating the coated substrate proximate to the defect by forming a layer on the coated substrate at the defect that chemically reduces a gas-selective metal component of a liquid activation composition, and subsequently applying the liquid activation composition to the layer, thereby forming at least one selectively surface activated region of nuclei on the coated substrate, said nuclei including the gas-selective metal; and

c) preferentially plating a second metal on the selectively surface activated region of the coated substrate, thereby forming the plated substrate.

41. (Original) The method of Claim 40 wherein at least one of the first metal and the second metal includes a hydrogen-selective metal or an alloy thereof.

42. (Original) The method of Claim 41 wherein the hydrogen-selective metal is palladium or an alloy thereof.

43. (Original) The method of Claim 40 wherein the defect includes a pore and selectively surface activating the coated substrate proximate to the defect includes surface activating the pore.

44. (Original) The method of Claim 40 wherein the step of selectively surface activating the coated substrate proximate to the defect includes seeding the coated substrate proximate to the defect with nuclei of a gas-selective metal.

45. (Original) The method of Claim 44 wherein a liquid activation composition is used to selectively seed the coated substrate proximate to the defect with nuclei of a gas-selective metal.

46. (Original) The method of Claim 45 wherein the first metal is deposited over the porous substrate in an amount sufficient to substantially prevent flow of a liquid activation composition from a first side of the coated substrate to a second side of the coated substrate.

47. (Original) The method of Claim 40 wherein the porous substrate has a first side and a second side, wherein selectively surface activating the coated substrate proximate to the defect includes surface activating the coated substrate proximate to the defect from the first side of the porous substrate, and wherein preferentially depositing the second metal on the selectively surface activated region of the coated substrate includes depositing the second metal on the selectively surface activated region from the second side of the porous substrate.

48. (Original) The method of Claim 40 wherein preferentially depositing the second metal on the selectively surface activated region of the coated substrate includes depositing the second metal by electroless plating.